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A comparative assessment of intravenous norepinephrine and mephentermine during spinal anaesthesia for caesarean section

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Abstract
Background: The present study compared intravenous norepinephrine and mephentermine for maintenance of blood pressure during spinal anaesthesia for caesarean section in known patients.
Materials & Methods: The present study was conducted on 62 females planed for elective surgery. Patients were divided into 2 groups of 31 each. Group I received bolus intravenous norepinephrine 8µg and group II received mephentermine 6mg for the maintenance of intraoperative systolic blood pressure. HR, SBP and DBP were recorded at every 2 min interval till 20 min and thereafter at every 5 min interval till the completion of surgery. Complications were also recorded.
Results: There was fall in SBP from baseline till 15 minutes in both groups then started increasing till 60 minutes. There was fall in DBP from baseline till 20 minutes in both groups then started increasing till 60 minutes. The difference was non- significant (P>0.05). There were 6 cases in group I and 7 in group II having nausea/vomiting, shivering was seen 5 in group I and 6 in group II, headache 4 in group I and 3 in group II and hypertension 3 in group I and 4 in group II. The difference was non-significant (P>0.05).
Conclusion: Authors found that intravenous norepinephrine was better than mephentermine in maintaining blood pressure.

Keywords: Norepinephrine, Mephentermine, Systolic blood pressure

Introduction
Spinal anaesthesia induced hypotension (SAIH) is reported in 80% parturient during cesarean section (CS) because of anaesthetic blockade up to T4 level. Severe and sustained SAIH is detrimental to both mother and baby [1]. The choice of the most effective management strategy for SAIH during CS continues to be one of the main challenges in obstetric anaesthesia. Many techniques and various vasopressors have been tried and studied for SAIH, but no single method was found to be adequate or superior [2].
Mephentermine appears to act by indirect stimulation of β-adrenergic receptors causing the release of norepinephrine from its storage sites. For maintenance of blood pressure in hypotensive states, the dose for adults is 30-45 mg as a single dose, repeated as necessary or followed by intravenous infusion of 0.1% mephentermine in 5% dextrose, with the rate and duration of administration depending on the patient's response [3]. The most common side effects are drowsiness, incoherence, hallucinations, convulsions, slow heart rate, fear, anxiety, restlessness, tremor, insomnia, confusion, irritability, and psychosis. Nausea, vomiting, reduced appetite, urinary retention, dyspnea, weakness. Potentially fatal reactions are due to atrioventricular block, central nervous system stimulation, cerebral hemorrhage, pulmonary edema, and ventricular arrhythmias [4].
Norepinephrine, a potent α-agonist and a weak β-agonist, commonly used in septic shock has been showing promising results in many studies for SAIH with respect to maternal haemodynamic stability [5]. The present study compared intravenous norepinephrine and mephentermine for maintenance of blood pressure during spinal anaesthesia for caesarean section in known patients.

Materials & Methods
The present study was conducted in the department of Anesthesiology on 62 females planed for elective surgery. All patients were informed regarding the study and their written consent

was obtained. Approval was obtained from ethical committee.

Data such as name, age, gender etc. was recorded. Patients were divided into 2 groups of 31 each. Group I received bolus intravenous norepinephrine 8µg and group II received mephentermine 6mg for the maintenance of intraoperative systolic blood pressure.

HR, SBP and DBP were recorded at every 2 min interval till 20 min and thereafter at every 5 min interval till the completion of surgery. Complications were also recorded. Results were analyzed statistically. P value less than 0.05 was considered significant.

Results

Table 1: Distribution of patients

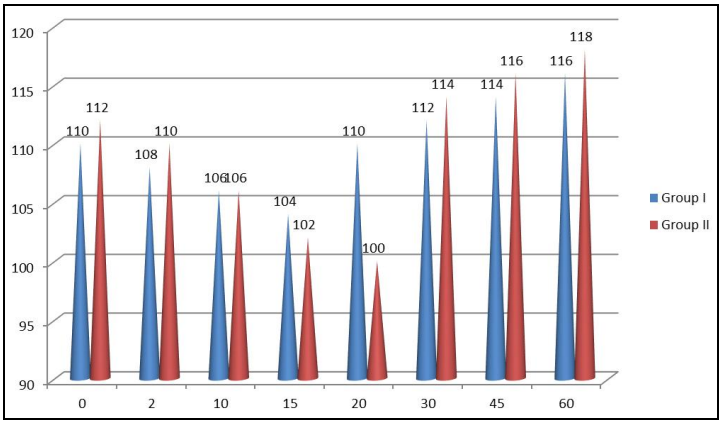
Groups	Group I	Group II
Agent	8µg Norepinephrine	6 mg Mephentermine
Number	31	31

Table I shows that group I patients were prescribed 8µg Norepinephrine and group II received 6 mg Mephentermine. Each group had 31 patients.

Table 2: Assessment of systolic blood pressure I both groups

Duration (minutes)	Group I	Group II	P value
0	110	112	0.12
2	108	110	0.24
10	106	106	0.16
15	104	102	0.18
20	110	104	0.21
30	112	114	0.24
45	114	116	0.31
60	116	118	0.51

Table II, graph I shows that there was fall in SBP from baseline till 15 minutes in both groups then started increasing till 60 minutes. The difference was non-significant (*P*>0.05).

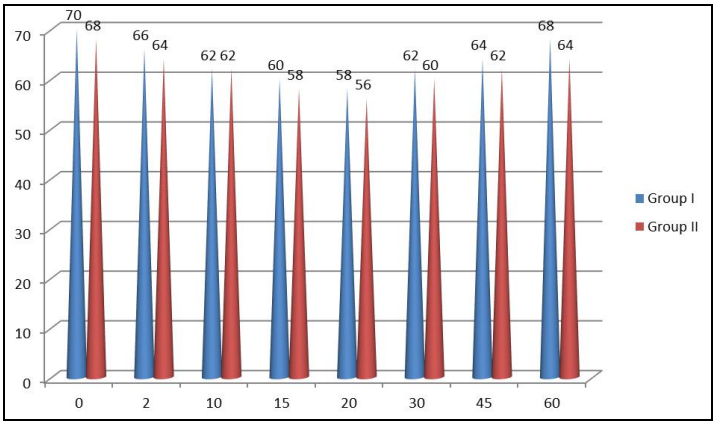


Graph 1: Assessment of systolic blood pressure in both groups

Table 3: Assessment of diastolic blood pressure in both groups

Duration (minutes)	Group I	Group II	P value
0	70	68	0.74
2	66	64	0.81
10	62	62	0.92
15	60	58	0.25
20	58	56	0.15
30	62	60	0.31
45	64	62	0.12
60	68	64	0.06

Table III, graph II shows that there was fall in DBP from baseline till 20 minutes in both groups then started increasing till 60 minutes. The difference was non-significant (*P*> 0.05).



Graph 2: Assessment of diastolic blood pressure in both groups

Table 4: Complication in both groups

Complication	Group I	Group II	P value
Nausea/ Vomiting	6	7	0.92
Shivering	5	6	0.93
Headache	4	3	0.81
Hypertension	3	4	0.81

Table IV shows that there were 6 cases in group I and 7 in group II having nausea/vomiting, shivering was seen 5 in group I and 6 in group II, headache 4 in group I and 3 in group II and hypertension 3 in group I and 4 in group II. The difference was non- significant (P>0.05).

Discussion

General anesthetics and regional anesthetics are associated with different risks. In general anesthesia, there is a risk of the woman vomiting while unconscious and the vomit getting into her lungs (called aspiration of stomach contents) [6]. Although this is very rare, it can be life-threatening. Women who have an epidural or a spinal block occasionally experience a sudden major drop in blood pressure [7]. They might also have a type of headache that can be caused by the injection into the epidural or subarachnoid space ("post-dural puncture headache"). In the past, Cesarean sections were nearly always done under general anesthetic, but nowadays more women and their doctors decide to do an epidural instead [8]. The present study compared intravenous norepinephrine and mephentermine for maintenance of blood pressure during spinal anaesthesia for caesarean section in known patients.

In this study, group I patients were prescribed 8µg Norepinephrine and group II received 6 mg Mephentermine. Each group had 31 patients. Onwochei *et al.* [9] studied the effect of different intermittent i.v. boluses of norepinephrine to prevent SAIH in cesarean delivery. The results obtained were feasible and were not associated with significant maternal or fetal adverse effects.

We found that there was fall in SBP and DBP from baseline till 15 minutes in both groups then started increasing till 60 minutes. The difference was non- significant (P>0.05). Ngan Kee *et al.* [10] compared norepinephrine to phenylephrine for maintaining SBP under spinal anaesthesia in CS with a computer-controlled closed-loop feedback system and noted higher response % which is well correlated with our finding. The higher response percentage with norepinephrine and requirement of frequent boluses in our study could be because of the faster onset of action and shorter half-life of norepinephrine compared to mephentermine.

We found that there were 6 cases in group I and 7 in group II having nausea/vomiting, shivering was seen 5 in group I and 6 in group II, headache 4 in group I and 3 in group II and hypertension 3 in group I and 4 in group II. The difference was non- significant (P>0.05). Shah *et al.* [11] compared the effect of intermittent intravenous boluses of norepinephrine and frequently used mephentermine for management of SAIH in caesarean section (CS) to prove whether norepinephrine produces comparable effects or superior to mephentermine in 256 parturients posted for elective CS under SAB were randomly allocated into Group-N and Group-M (n = 84) using chit system, who received boluses of intravenous norepinephrine 8µg and mephentermine 6mg for SAIH, respectively. Systolic blood pressure (SBP), diastolic blood pressure (DBP), heart rate (HR), Response %, Apgar score and maternal complications were analysed. The changes in SBP and DBP were comparable in both the groups. It was significantly low after SAB compared to baseline and significantly high compared to 1st hypotensive value in both the groups throughout the study period.

Mephentermine has been widely used in India because of its safety, ready availability, and familiarity to most anaesthesiologists. It acts mainly by indirect action (release of norepinephrine) causing an increase in myocardial contractility and HR, and hence cardiac output; it also causes peripheral vasoconstriction and raises the blood pressure by direct action on α and β receptors [12].

Conclusion

Authors found that intravenous norepinephrine was better than mephentermine in maintaining blood pressure.

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